THE RELATION BETWEEN EMPLOYEE ATTENDANCE AND PRODUCTIVITY

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The problem. Absenteeism has been identified as a major problem among employees who are paid on an hourly basis. The use of operant procedures to correct attendance problems has been successful, but most programs have relied exclusively on monetary reinforcers. Furthermore, applied researchers have yet to examine the relationship between measures of attendance and productivity. The present study investigated the effectiveness of non-monetary reinforcers on attendance and the relationship between attendance and productivity.

Procedures. Daily attendance feedback and social reinforcement were used to improve employee attendance. Workers' productivity was monitored concurrently to determine the relation to changes in attendance.

Findings. Both feedback and social reinforcement were effective in improving attendance. The mean rate of productivity among workers was found to increase slightly as absenteeism increased.

Conclusions. Non-monetary reinforcers can effectively control employee absenteeism. Worker productivity may change with changes in group attendance and such performance variables should be considered in future attendance improvement efforts.

Recommendations. The present study manipulated attendance variables and measured productivity concurrently. More research is needed to further assess relationships between these variables. It would also be helpful to examine how attendance changes when production variables are manipulated.

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CHAPTER I

INTRODUCTION

Absenteeism has been identified as a major problem in the business community, especially among nonexempt employees, those paid on an hourly basis. Interest in the use of operant procedures to correct attendance problems has grown in recent years, and while the number of rigorous applied experiments is limited, the results of various investigations thus far are encouraging. (See Johnson & Peterson, 1975, and Hamner & Hamner, 1976, for a conspectus of implementation guidelines). These early successes have prompted the current research effort, aimed at the expansion and refinement of behavioral technology in this area. To be specific, the current literature seems limited in two respects: First, the range of effective reinforcers for attendance has been limited almost exclusively to money. Moreover, applied researchers have yet to examine the relationship between measures of attendance and productivity.

The majority of studies using operant procedures to influence attendance involve some manipulation of financial incentives. In 1969, for example, Lawler and Hackman used a pay incentive plan to reinforce attendance at work among building maintenance persons. Attendance in one group improved by six percent, a statistically significant change. Following B. F. Skinner's (1973) suggestion that a lottery

system might solve some of management's problems, a number of studies involving lottery-type incentive plans were conducted. Pedalino and Gamboa (1974) distributed one playing card a day to punctual hourly employees in a manufacturing facility with the understanding that the best poker hand at the end of five days would win twenty dollars. Absenteeism decreased by 18 percent. Wallin and Johnson (1976) obtained a 30.6 percent decrease in total sick-leave expenses for an electronics firm where employees qualified for a monthly drawing if they had perfect attendance and punctuality records. A ten dollar cash prize and public posting of the winner's names served as reinforcers. Stephens and Burroughs (1978) demonstrated significant decreases in absenteeism in hospital staff using two reward systems, each of which involved a drawing for a $20 cash prize. Eligibility for the drawings required perfect attendance during a three-week period. Finally, Orpen (1978) provided statistical evidence that a fifty-cent weekly bonus for perfect attendance markedly reduced absenteeism of factory workers. Collectively, these studies have demonstrated that attendance behavior can be improved using operant procedures and that such changes can lower personnel costs associated with absenteeism.

Although the use of money has certainly been successful in altering employee behavior, many businesses may be unable or unwilling to provide additional employee compensation. For example, Pedalino and Gamboa (1974) terminated their

incentive system after 16 weeks because "the bargaining date for a new union contract was approaching and the company did not want to find itself negotiating this incentive system into the contract" (p. 698). The use of a lottery system to distribute monetary reinforcers may be illegal (Daily Labor Report, 1976) and management may also object to a system that seems to bribe the worker (Johnson & Peterson, 1975; Wallin & Johnson, 1976).

Money, however, is only one of many available reinforcers. Non-monetary reinforcers (e.g., time-off without pay) combined with progressive disciplinary warnings effected a 40 percent decrease in absenteeism among 7,500 production workers (Kempen & Hall, 1977). When Gupton and LeBow (1971) made the opportunity to sell renewal appliance service contracts contingent upon one new service contract sale, business improved by 22 percent. Lamal and Benfield (1978) used self-monitoring to increase punctuality and the time spent working by a draftsman, and feedback plus social reinforcement effectively changed work-related behavior in two studies (Dick, 1978; Runnion, Watson & McWhorter, 1978). Miller (1978) has also reported several case studies which demonstrate the use of feedback and social reinforcement in the business setting. Thus, it seems that attendance may be improved by the use of other reinforcers presented in contingent fashion, without the problems associated with supplementary compensation.

While most managers would be satisfied with an improvement in employee attendance only, the behavior analyst should be concerned with important additional variables. Gilbert (1978) has presented a model for use by management (and others) that helps identify such variables. Gilbert's procedures deviate from the standard behavior analysis; instead of examining antecedents and consequences to assess controlling relations of a specific behavior, the emphasis is placed on the accomplishments of behavior. When the goals to be realized through behavior take precedent over behavior itself, the variables influencing attainment of goals must be considered. As Gilbert suggests, "What we want as a result of measuring the behavioral side of performance is a list of deficiencies that are significant only because they lead to important accomplishment deficiences" (p. 23). Previous attendance studies have failed to link attendance behavior with desired accomplishments. Table 1 shows dependent measures taken in studies which examined attendance. In these studies the emphasis has been placed on changes in rates of attendance. There seems to be an a priori assumption that high rates of attendance are beneficial to the company, yet no attempt has been made to examine the relationship between attendance and employee performance. Increased attendance should not be assumed to guarantee adequate employee performance. For example, the consequence of improved attendance may be a decrease in

Table 1

The dependent variables used to evaluate attendance studies.

Study	Dependent Variable
Lawler and Hackman (1969)	Percent of scheduled hours actually worked.
Pedalino and Gamboa (1974)	Statistical analysis of changes in absence rates.
Wallin and Johnson (1976)	Changes in monthly sick-leave expenses.
Kempen and Hall (1977)	Percent of absenteeism and social significance.
Stephens and Burroughs (1978)	Statistical analysis of changes in absence rates.
Orpen (1978)	Statistical analysis of changes in absence rates.

individual output, that is, a division of the work load between those employees present. Productivity may then remain unchanged while the costs increase. Conversely, if sustained improvement in attendance results in increased productivity, management may be forced to lay off surplus personnel, as in the Kempen and Hall (1977) study.

The present study was designed to verify the effectiveness of operant procedures on attendance, to demonstrate the utility of procedures devoid of supplemental monetary reinforcers, and to examine the relationship between attendance and productivity. The intervention procedures for this study were greatly influenced by the behavior engineering model suggested by Gilbert (1978). Essentially, Gilbert suggests that behavioral deficiencies be corrected by analyzing the following areas in sequence: (1) Information (feedback); (2) Instrumentation (tools and materials); (3) Motivation (the use of contingent monetary and non-monetary rewards); (4) Knowledge (training); (5) Capacity (ability); and (6) Motives (purpose).

The present study was conducted in the corporate records department of a large midwestern insurance company. Absenteeism in the records department concerned the management and was thought to contribute to unfinished or backlogged work. Gilbert's engineering model suggests that attendance information or feedback be improved at the outset. Hence, the first intervention in this study focused entirely on

improving information to the employees (see Table 2). Instrumentation, the next area of analysis, was judged as adequate and required no intervention. The existing filing system seemed to function efficiently with the company providing all the necessary materials for competent filing. Motivation, in the form of monetary and non-monetary incentives, was examined next. While the salary for a file clerk was found to be well related to experience and competitive with other companies, no additional non-monetary reinforcers seemed to be operative. Since the financial incentives were reasonable and because of the problems associated with their manipulation, supervisor training in the use of social reinforcement was selected to correct the next major deficiency.

The areas of Knowledge, Capacity and Motives were not manipulated, partially because of experimental design considerations. In order to have the biggest effect on behavior at the least cost, Gilbert (1978) recommends that we look to these areas only after other remedies have been exhausted. Knowledge deficiencies often require expensive training that may be unnecessary when information or instrumentation is improved. Most people also have the capacity and motives to perform well, but they frequently lack the proper feedback or guidance. Gilbert suggests that it is usually impossible to make changes in all of these areas at once and the sequence suggested allows managers to focus on techniques that provide "the greatest leverage" (p. 89) for improving performance.

Table 2

Gilbert's behavior engineering sequence.

Variables	Status in records department
Information	
Relevant and frequent feedback	Deficient
Descriptions of performance expectations	Deficient
Clear guides to adequate performance	Deficient
Instrumentation	
Well designed tools and materials	Adequate
Motivation	
Adequate financial incentives	Adequate
Nonmonetary incentives available	Deficient
Knowledge	Unexamined
Capacity	Unexamined
Motives	Unexamined

CHAPTER II

METHOD

Subjects

The subjects in this study were 20 females employed at the home office of a large midwestern insurance company. Employee turnover and vacations during the course of the study changed this figure slightly (range: 12 to 20; mean: 17). Sixteen of the subjects were clerks responsible for locating company records within the department files. Four others served in supporting functions of file repair, organizing file requests and answering phones.

Employees received a weekly salary plus benefits that included sick-leave pay. The number of sick-leave days depended on the length of employment. Additional time-off with pay was granted for voting, jury duty or a death in the family. Employee attendance was rated annually to determine, in part, merit salary increases.

Customarily, aversive control techniques were used by the company for repeated absenteeism. Initially the manager would issue a verbal warning to the offending employee. If behavior did not improve, the employee was subject to a three-month probationary period. At the end of three months employee performance is reviewed to determine whether probation should be terminated or the employee dismissed.

The average rate of absenteeism throughout the company

for 1978 was 3.5 percent. Absenteeism in the records department averaged 8.0 percent over the seven months preceding intervention. The latter figure was obtained by dividing the number of employees present each day by the number of employees scheduled for work. In this study workers were regarded as absent if they worked less than one-half of their scheduled hours regardless of the cause. Employees present for more than half of their scheduled hours were permitted to make up missed time before and after regular working hours.

Data Collection and Reliability

The accuracy of the attendance data was not monitored by the experimenter. A system of internal checks operating within the company verified the accuracy of these data: All employees were required to record the actual hours worked each day on a time card and the department manager also collected daily attendance data. At the end of each week employees submitted time cards to the manager for verification of hours worked. Attendance was further linked to a performance measurement system operating within the department. Since the manager would have to reconcile fraudulent attendance data in two sets of records, the probability of detection and subsequent punishment was high. Moreover, during the second and fourth experimental phases, the subjects were required to self-record attendance on a feedback chart, thus providing a third record of attendance.

Employee performance data were also collected from company sources. The records department utilized a program which systematically assigned and evaluated all work. This program created a controlled work environment by establishing standards of acceptable performance and appraising performance against those standards. The performance criteria for this system consisted of time requirements for the completion of various departmental activities. Employees were given work assignments throughout the day that were always accompanied by a small ticket specifying the volume of work and the established target time to complete the task. Employees were required to indicate the activity performed, the volume and the amount of time spent to complete the activity on the ticket and on a daily assignment sheet. At the end of the day a performance percentage was computed by dividing the established time standards by the actual time spent working. The department manager posted daily summaries of these data for all employees.

A reliability check of this system two months prior to intervention showed 100 percent accuracy for the timing of various activities. On the eleven days when reliability was checked during the study (five times during baseline and on six occasions during intervention) the experimenter chose five employees at random and recorded the time spent on a targeted activity. The experimenter compared these figures with the times reported by the employees on the activity

tickets. An agreement was scored when the experimenter and employee times agreed to within one minute. The experimenter and the employees used the same wall clock to time targeted activities. The average duration of a targeted activity was twenty minutes. Reliability percentages were calculated by dividing the number of agreements by agreements plus disagreements times 100. Reliability was consistently at 100 percent.

Procedures

This study used a reversal design that incorporates three independent variables (ABACD), where A represents baseline conditions, B, C and D the experimental interventions.

Baseline I

During baseline I no programmed manipulations were introduced. Baseline figures were obtained from the permanent records provided by the department manager. These data included the total scheduled minutes for each employee per day and the total minutes absent per day.

Feedback

In this phase a 56 X 71 centimeter chart was posted conspicuously in the working area of the department, near the entrance. The chart had three components: The first feature was a column listing the names of all employees. Adjacent to the employee's name were 31 columns in which

employees recorded their attendance by checking the appropriate space each day. The result was a cumulative monthly record of employee attendance at work. A statement of the department attendance goals for the month was incorporated into a graph printed directly above this panel. Daily attendance rates were plotted by the manager on the graph where a blue and a red line designated acceptable (one employee absent or 5 percent) and outstanding (no absences or 0 percent) performance respectively.

Baseline II

During this phase the feedback chart was removed and data were collected under pre-experimental conditions. The management required that the duration of this phase be short so that any improvement in attendance resulting from the feedback conditions would not be totally lost.

Feedback plus Social Reinforcement I

After the second baseline, the feedback chart was reintroduced into the records department. In addition to the second presentation of the chart, the manager received training in the theory and use of social reinforcement. The manager learned to deliver positive comments in three specific situations: When an absent employee returned to work (e.g., "It's nice to have you back, we really missed you"); when an employee phoned to report their absence ("I hope you can make it back soon")(Excuses were ignored); and when an employee attended regularly ("You certainly have fine

attendance, you have not missed a day this month"). The feedback chart was used extensively to reinforce improving group attendance ("It's good to see that everyone is here today"). Managerial training was provided in a conference room near the records department. The experimenter delivered instructions, modeled appropriate responses and role-played situations with the manager.

Feedback plus Social Reinforcement II

This phase of the study was implemented when absenteeism failed to decrease in the preceding phase. The manager reported that his morning routine was disrupted when he left his desk to deliver praise as the employees arrived at work. The delivery of praise and approval had apparently been discontinued shortly after implementation of the initial feedback plus social reinforcement phase. To correct this situation the experimenter and manager changed the procedures. It was agreed that praise would be delivered later during the morning hours each day as the manager made routine visits within the department. The experimenter also made daily visits to the department where he modeled the delivery of praise and praised the manager's renewed efforts.

CHAPTER III

RESULTS

Attendance

Absence rates for each phase of the study are shown in Figure 1. During the 30 day baseline period absenteeism averaged 4.8 percent. During the 30 day feedback condition the average rate of absenteeism decreased to 2.4 percent. When feedback procedures were withdrawn absenteeism increased near baseline levels to 4.7 percent. In the first feedback plus social reinforcement phase, the rate of absenteeism rose to 6.04 percent. During the next phase (feedback plus social reinforcement II) absenteeism decreased to 3.2 percent.

Changes in attendance rates were analyzed statistically using the Mann-Whitney U (one-tailed) test. This data is presented in Table 3. The results show that three of the five comparisons were significant when examined alone (Baseline I and feedback; feedback and baseline II; feedback plus social reinforcement I and feedback plus social reinforcement II). However, since the tests were non-orthogonal and post hoc comparisons were made, Dunn's procedure was used to adjust for alpha slippage. This procedure involves dividing the overall alpha level by the number of comparisons made. The alpha level required then becomes .01 and the comparisons are not statistically significant.

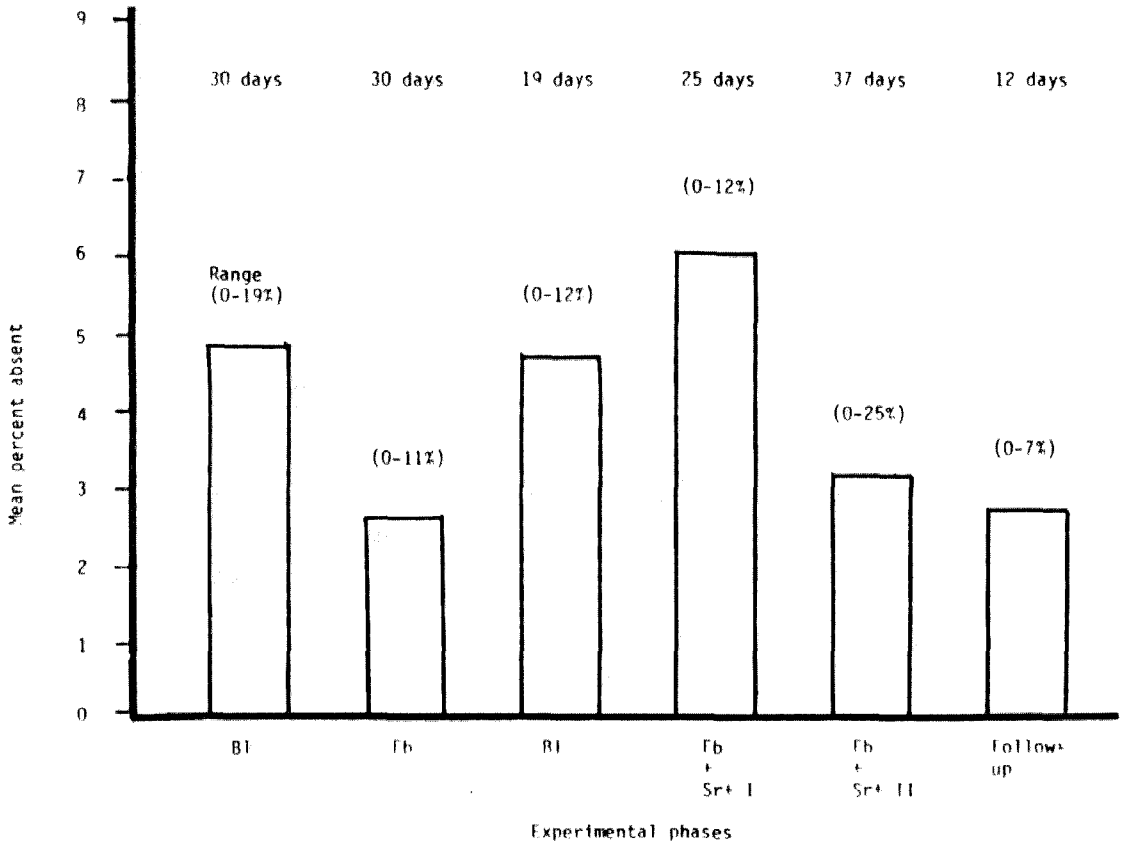

Figure 1. Mean percent absent as a function of experimental phases.

Table 3

Comparison of treatment conditions using the Mann-Whitney U test

Conditions	U Value	Probability
Baseline and Feedback	586.5	.0217
Feedback and Baseline II	196	.0336
Baseline II and Fb. + Sr+ I	220	.3409
Fb. + Sr+ I and Fb. + Sr+ II	591.5	.0322
Fb. + Sr+ II and Follow-up	222	.50

Table 4 shows the average number of working days missed per month by records department employees. The mean rate of absenteeism was lower for the four months of this study at .8 days per month, compared with the same months from the two preceding years which averaged 1.4 days per month.

Productivity

Table 5 shows the average individual performance percentages across experimental phases and with varying levels of absenteeism. In the first and fourth phases productivity was highest when one or more employees were absent and lower when all workers attended. Productivity averaged 105.76 percent during baseline and 110.38 percent during feedback plus social reinforcement I when all employees attended. When one or more employees were absent mean productivity increased to 109.5 percent during baseline and 112.5 percent for the feedback plus social reinforcement condition. During the feedback only condition, the mean productivity percentage was 111 percent when one employee was absent. When all employees were present or when two or more workers were absent productivity rates were reduced to 109.84 and 109.5 percent. The data for basline period two shows that production rates were highest (115.5 percent) when all employees attended. Productivity was only slightly lower when two or more employees were absent (115 percent) and lowest when one person was absent (110.71 percent). In the last phase,

Table 4

Average number of days missed per month by records department employees

	1977	1978	1979
July	1.0	1.3	.6
August	1.5	1.2	.6
September	1.7	1.7	.8
October	1.7	1.4	1.2

Table 5

Mean individual productivity percentages across experimental phases and with varying levels of absenteeism

	0 Absent	1 Absent	2+ Absent
Baseline	105.76	109.63	109.33
Feedback	109.84	111	109.5
Baseline	115.5	110.71	115
Feedback & Social Reinforcement I	110.38	113.17	111.8
Feedback & Social Reinforcement II	114.86	114	117.67
Mean totals	111.268	111.702	112.66

feedback plus social reinforcement II, productivity was highest when two or more were absent (117.67 percent) and lower when one or no workers were absent (114 and 114.86 percent). Overall productivity for this study increased directly with absenteeism. The mean productivity figure was 111.27 percent when all employees attended, 111.70 percent when one person was absent and 112.66 percent when two or more persons were gone.

Figure 2 shows the number of hours of backlogged or unfinished work reported by the manager each day. During baseline I the mean number of backlogged hours was 11.27. In the feedback condition, no unfinished work was reported. During baseline II, the average number of backlogged hours increased to 2.8. There were two days of unfinished work in both feedback plus reinforcement phases, but these were associated with midweek holidays which interrupted usual performance.

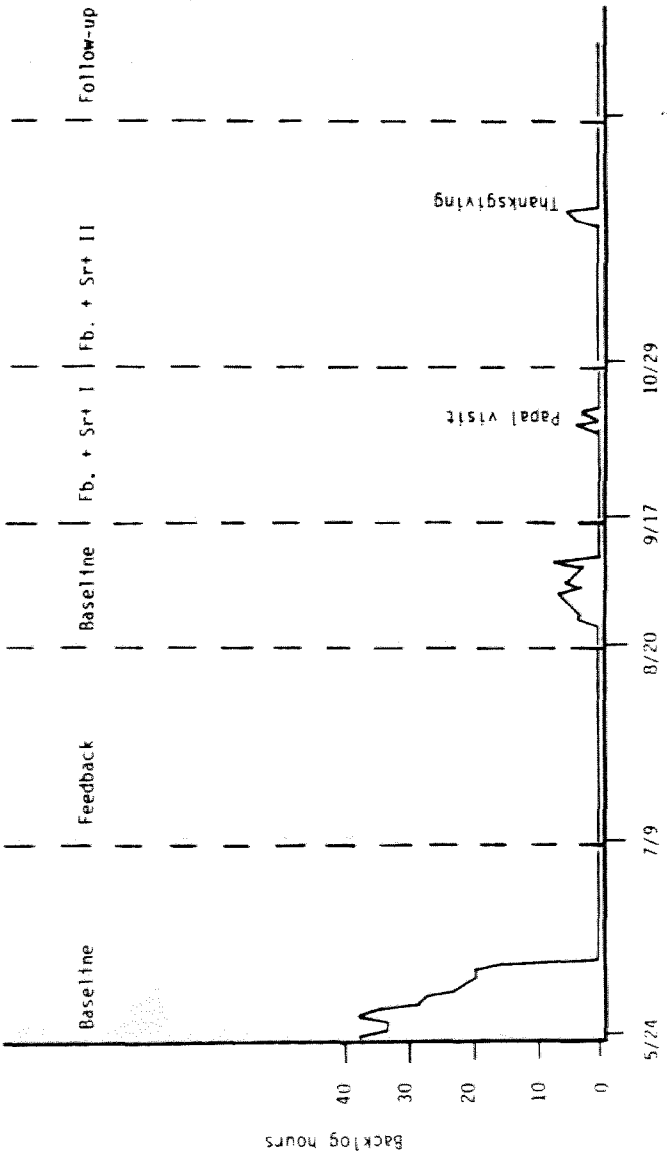

Figure 2. Hours of backlogged work across days.

CHAPTER IV

DISCUSSION

The majority of attendance studies have utilized financial incentives as the independent variable. The literature suggests that such use may be problematic when union contracts are involved (Pedalino & Gamboa, 1974) and possibly illegal when used in a lottery system (Daily Labor Report, 1976). Management may also object to a system that seems to bribe the worker (Johnson & Peterson, 1975; Wallin & Johnson, 1976). Non-monetary reinforcers represent an effective alternative for use by management. In this study a simple feedback chart produced a fifty percent decrease in absenteeism and maintained a forty-three percent decrease at follow-up. The procedures also reduced the variability of attendance in the department by decreasing the number of days when several employees were absent.

The failure of feedback plus social reinforcement to further decrease absenteeism following baseline II may be explained by the department manager's failure to continue delivery of contingent praise and approval shortly after implementation. The procedures called for a large change in the manager's usual working behavior and more individual contact with the employees. When the experimenter modeled the delivery of praise within the department and praised the manager's renewed efforts, absenteeism decreased below

baseline levels.

The second purpose of this study was to examine the relationship between attendance and productivity. The data show that mean individual productivity increased slightly when absenteeism was high. Mean individual productivity percentages for the entire study increased directly with increased absenteeism. Although the changes in productivity are not significant, using conservative procedures, they are highly suggestive and the direction of the small changes is important; productivity did not increase with improved attendance.

Despite the lowered mean productivity per worker when all employees attended, the amount of backlogged work was highest during high absentee phases (both baseline conditions). Although individual production was slightly higher during high absentee days, the high rate among fewer workers did not prevent the occurrence of backlogged work. This may not be true in all settings, however, and requires further empirical study.

Prior to this study a staff of twenty employees was required to control the level of backlogged work. When behavioral procedures led to increased attendance, a staff of seventeen was sufficient to control backlog. This study saved the company the equivalent of three full time salaries, conservatively estimated at $2233 per month. No staff layoffs were necessary; when records department employees left

the company, replacements were simply not recruited.

The results of this study indicated that previously unexamined variables need attention in future attendance improvement efforts. Programs that are designed to increase attendance may have the effect of decreasing productivity. Program designers, therefore, should consider not only rates of absenteeism, but individual and group productivity.

As this study has suggested, the relation between attendance and productivity is not a simple one. The conventional approach of research in business and industry has been to treat attendance as an end in itself--as an accomplishment of the worker. Thus, if procedures are effective in increasing attendance the research is considered successful. Whereas attendance is clearly a prerequisite for production to occur, merely arriving cannot be treated as an accomplishment per se. The critical accomplishment is efficient productivity, and the focus of research should be on the variables which control productivity as well as attendance. If the variables which control productivity do not exert control over attendance, then research should focus on the determinants of attendance.

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